

We claim:

1. A process for forming an extended polyalkylene-grafted interpolpolymer or gel, comprising:
  - 5 a) mixing
    - 1) a polymer comprising mer units derived from maleic anhydride and mer units derived from at least one of
      - (A) a vinyl aromatic monomer, and
      - (B) an R<sup>1</sup>(R<sup>2</sup>)ethylene monomer in which R<sup>1</sup> and R<sup>2</sup>
10 independently are selected from H and substituted or unsubstituted C<sub>1</sub>-C<sub>20</sub> alkyl or alkoxy groups, and
    - 2) a maleated polyalkylene, so as to form a blend;
  - 15 b) to said blend, adding a diamine and allowing it to react with the mer units derived from maleic anhydride and with the maleated polyalkylene to form a polyalkylene grafted interpolpolymer; and
  - c) allowing the polyalkylene-grafted interpolpolymer to cool in said mixer and adding an extender to provide said extended polyalkylene-grafted interpolpolymer; and
  - 20 d) optionally, extruding the extended polyalkylene-grafted interpolpolymer to form a gel having a tan  $\delta$  of at least 0.3.
2. The process of claim 1 wherein step a) includes from about 50 to about 99 weight % of said polymer and from about 1 to about 50 weight % of said
 25 maleated polyalkylene and wherein step b) includes from about 0.1 to about 10 weight % of said diamine.
3. The process of any of claims 1 to 2 wherein said polymer comprises from about 0.01 to about 5 weight percent mer units derived from maleic
 30 anhydride.
4. The process of any of claims 1 to 3 wherein steps b), c) and, optionally a) are carried out sequentially in a mixer, with no physical manipulation of said polyalkylene grafted interpolpolymer prior to step c) and without removing any
 35 of the materials from said mixer

5. The process of any of claims 1 to 4 wherein step c) includes mixing about 10 weight percent to about 90 weight percent of said polyalkylene-grafted interpolpolymer with a total amount of about 90 weight percent to about 10 weight percent of said extender.

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6. The process of any of claims 1 to 5 wherein at least one of the following is true:

said vinyl aromatic monomer is selected from any one or more of styrene,  $\alpha$ -methylstyrene, *p*-methylstyrene, 4-phenylstyrene, *m*-methylstyrene, *o*-methylstyrene, *p*-tert-butylstyrene, and dimethylstyrene.

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$R^1$  and  $R^2$  independently are selected from methyl, ethyl, propyl, isopropyl, butyl, isobutyl, pentyl, isopentyl, hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl, tridecyl, tetradecyl, pentadecyl, hexadecyl, heptadecyl, octadecyl, nonadecyl, eicosyl, cyclopropyl, 2,2-dimethylcyclopropyl, cyclopentyl, cyclohexyl, methoxymethyl, methoxyethyl, methoxypropyl, methoxybutyl, methoxypentyl, methoxyhexyl, methoxyoctyl, methoxynonyl, ethoxydecyl, ethoxymethyl, ethoxyethyl, ethoxypropyl, ethoxybutyl, ethoxypentyl, ethoxyhexyl, ethoxyheptyl, ethoxyoctyl, ethoxynonyl, ethoxydecyl, propoxymethyl, propoxyethyl, propoxypropyl, propoxybutyl, propoxypentyl, propoxyheptyl, propoxyoctyl, propoxynonyl, propoxydecyl, butoxymethyl, butoxyethyl, butoxypropyl, butoxybutyl, butoxypentyl, butoxyhexyl, butoxyheptyl, butoxyoctyl, butoxynonyl, butoxydecyl, pentyloxymethyl, pentyloxyethyl, pentyloxypropyl, pentyloxybutyl, pentyloxypentyl, pentyloxyhexyl, pentyloxyoctyl, pentyloxynonyl, pentyloxydecyl, hexyloxymethyl, hexyloxyethyl, hexyloxypropyl, hexyloxybutyl, hexyloxypentyl, hexyloxyhexyl, hexyloxyheptyl, hexyloxyoctyl, hexyloxynonyl, hexyloxydecyl, heptyloxymethyl, heptyloxyethyl, heptyloxypropyl, heptyloxybutyl, heptyloxypentyl, heptyloxyhexyl, heptyloxyheptyl, heptyloxyoctyl, heptyloxynonyl, heptyloxydecyl, octyloxymethyl, octyloxyethyl, octyloxypropyl, octyloxybutyl, octyloxypentyl, octyloxyhexyl, octyloxyheptyl, octyloxyoctyl, octyloxynonyl, decyloxymethyl, decyloxyethyl, decyloxypropyl, decyloxybutyl, decyloxypentyl, decyloxyhexyl, decyloxyheptyl, 1-methylethyl, 1-methylpropyl, 1-methylbutyl, 1-methylpentyl, 1-methylhexyl, 1-methylheptyl, 1-methyloctyl, 1-methylnonyl, 1-methyldecyl, 2-methylpropyl, 2-methylbutyl, 2-methylpentyl, 2-methylhexyl, 2-methylheptyl, 2-methyloctyl, 2,3,3-trimethylbutyl, 3-methylpentyl, 2,3-dimethylpentyl, 2,4-dimethylpentyl, 2,3,3,4-tetramethylpentyl, 3-methylhexyl, and 2,5-dimethylhexyl.

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5 8. The process of any of claims 1 to 7 wherein, prior to step a), an amine is reacted with a portion of the mer units derived from the maleic anhydride to form maleimide mer units, wherein at least one of the following optionally is true of said imidization:

10 it is carried out immediately preceding step a) with no physical manipulation of the polyn.er prior to step a), and

it and step a) are carried out in a mixer without removing the imidization product from the mixer.

10. The process of claim 8, wherein said amine is a primary amine.

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                         2) a C<sub>4</sub> - C<sub>20</sub> cycloaliphatic hydrocarbon group,  
                         3) a C<sub>6</sub> - C<sub>20</sub> aromatic hydrocarbon group, or  
                         4) a C<sub>4</sub> - C<sub>20</sub> N-heterocyclic ring.

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5 methyl-4-aminoisopropyl-cyclohexylamine; 4,4'-diamino-dicyclohexyl; 4,4'-diamino-dicyclohexyl methane; 2,2'-(bis-4-amino-cyclohexyl)-propane; 3,3'-dimethyl-4,4'-diamino-dicyclohexyl methane; 1,2-bis-(4-aminocyclohexyl)-ethane; 3,3',5,5'-tetramethyl-bis-(4-aminocyclohexyl)-methane; 3,3',5,5'-tetramethyl-bis-(4-aminocyclohexyl)-propane; 1,4-bis-(2-aminoethyl)-benzene; benzidine; 4,4'-thiodianiline, 3,3'-dimethoxybenzidine; 2,4-diaminotoluene, diaminoditolylsulfone; 2,6-diaminopyridine; 4-methoxy-6-methyl-*m*-phenylenediamine; diaminodiphenyl ether; 4,4'-bis(*o*-toluidine); *o*-phenylenediamine; methylene-bis(*o*-chloroaniline); bis(3,4-diaminophenyl)sulfone; diaminodiphenylsulfone; 4-chloro-*o*-phenylenediamine; *m*-aminobenzylamine; *m*-phenylenediamine; 4,4'-C<sub>1</sub>-C<sub>6</sub>-dianiline; aniline-formaldehyde resin; trimethylene glycol di-*p*-aminobenzoate; bis-(2-aminoethyl)-amine; bis-(3-aminopropyl)-amine; bis-(4-aminobutyl)amine; bis-(6-aminohexyl)-amine; and isomeric mixtures of dipropylene triamine and dibutylene triamine.

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13. A single batch process for preparing a polymer composition which includes a polyalkylene-grafted interpolpolymer, said process comprising:

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a) forming a maleimide interpolpolymer in a mixing vessel by reacting an amine with a portion of maleic anhydride-derived mer units of an interpolpolymer comprising maleic anhydride-derived mer units and at least one of

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- 1) vinyl aromatic-derived mer units, and
- 2) R<sup>1</sup>(R<sup>2</sup>)ethylene-derived mer units in which R<sup>1</sup> and R<sup>2</sup> independently are H or substituted or unsubstituted C<sub>1</sub> to C<sub>20</sub> alkyl groups or alkoxyl groups;

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b) adding sufficient maleated polyalkylene such that the mixing vessel contains from about 1 to about 50 weight percent maleated polyalkylene and from about 50 to about 99 weight percent maleimide interpolpolymer;

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- c) mixing from about 0.1 to about 10 weight % of a diamine with the maleimide interpolpolymer and maleated polyalkylene in the mixing vessel to form said polyalkylene-grafted interpolpolymer; and
- d) optionally, without removing the product of step c) from the vessel, cooling the polyalkylene-grafted interpolpolymer in the mixer to a temperature at which an extender is stable in the polyalkylene-grafted interpolpolymer, and adding an extender to the mixer.